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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/681,040	10/07/2003	Pawel Czubarow	1035-O4280	2721

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EXAMINER	
KRUER, KEVIN R	
ART UNIT	**PAPER NUMBER**
1773	

DATE MAILED: 10/05/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	**Application No.** 10/681,040	**Applicant(s)** CZUBAROW ET AL.	
	Examiner Kevin R. Kruer	**Art Unit** 1773	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 June 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-52* is/are pending in the application.

4a) Of the above claim(s) *44-49* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-43 and 50-52* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *07 October 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *6/17/2005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election of Group I, claims 1-43 and 50-52 in the reply filed on June 17, 2005 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

2. Claims 44-49 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 6/17/2005.

Information Disclosure Statement

3. The information disclosure statement filed June 17, 2005 has been fully considered. An initialed copy of said PTO-1449 is enclosed herein.

Claim Rejections - 35 USC § 112

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. The rejection of claim 14 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention has been overcome by cancellation.

Claim Rejections - 35 USC § 103

6. Claims 1-15, 18, 21, 23-32, 34, 36, 37, and 39-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,391,442 (herein referred to as "Duvall') in view of Shikata et al (US 6,255,376).

Duvall teaches a thermal interface material that is to be provided between a heat sink and a heat source. The interface material includes thermally conductive filler particles dispersed in a phase change material. The phase change material softens and flows at the operating temperature of the heat source, thereby providing good thermal contact with uneven surfaces of the heat source and heat sink. The phase change material includes a polymer component and a melting point component, which adjusts the softening temperature of the phase change material to the operating temperature of the heat source (abstract). The composition may further comprise wetting agents, herein understood to read on the claimed "surfactant." (col 7, lines 4+). The phase change material is preferably wax or a wax like material such as 2-{2-{2-(2-hydroxyethoxy) ethoxy}ethoxy} ethyl ester (herein relied upon to read on the claimed hydroxylated wax of claim 3) (col 6, lines 11+). The wax is included in amounts of 10-80wt% preferably 20-60wt% (col 6, lines 60+) and has a melting point of 30-120°C (col 5, lines 46+). The polymer component may comprise acrylic polymers or silicone polymers (col 6, lines 1+) and is included in amounts of 10-70wt% (col 6,lines 61+). The conductive particle may comprise boron nitride (col 5, lines 28+) and is included in amounts of 10-80wt% of the material (col 6, lines 61+).

The heat source is herein understood to read on the claimed "conductive film" of claim 36 and the protective release film is herein understood to read on the claimed "protective barrier" of claim 41 (col 4, lines 7+).

Duvall does not teach that the composition may comprise a surfactant. However, Shikata teaches a thermally conductive interface material that is used between a heat sink and a heat-generating source (abstract). The composition comprises a thermoplastic carrier and a conductive filler (abstract). The composition further comprises 0.5-5wt% of a glycerin derived surfactant (col 8, lines 30+). Said surfactant ensures a homogenous dispersion of said particles in said carrier (col 8, lines 56+). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the glycerin based surfactant taught in Shikata as the surfactant of the composition taught in Duvall. The motivation for doing so would have been that Shikata teaches said glycerins ensure homogeneous dispersion of conductive particles in thermal interface composition.

7. Claims 1, 2, 6, 7, 10-17, 21-23, 25, 27, 28, 30, 31, 33, 36, 38, 40, 41, and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bunyan et al (US 6,054,198).

Bunyan teaches a thermally conductive interface for conductively cooling heat generating electronic components. The composition is interposable between the thermal interface of a heat source and a thermal dissipation member (col 4, lines 39+). The film may take the form of a tape with a release sheet (col 7, lines 33+) and is applied to the interface surface of the dissipation member (col 7, lines 61+). The composition comprises 25-50wt% of a pressure sensitive adhesive, 50-75wt% of an olefinic material having a melting temperature of 50-60°C, and 20-80wt% of a thermally conductive filler (col 8, lines 16+). The adhesive may comprise an acrylic polymer (col 7, lines 30+). The olefinic low melt component may comprise a wax (col 9, lines 9+). The conductive filler may comprise boron nitride (col 9, lines 50+. The composition may further comprise a wetting agent, herein relied upon to read on the claimed surfactant (col 9, lines 59+).

Bunyan does not teach that cocamide may be utilized as the surfactant taught therein. However, cocamide is known in the art to be a surfactant. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize cocamide (an alkanolamide) as the surfactant taught in Bunyan. The motivation for doing so would have been that cocamide is known in the art to be a surfactant.

8. Claims 1, 2, 6, 7, 10-15, 18, 21-23, 25, 27, 28, 30-32, 34, 36, 37, and 39-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bunyan (US 6,054,198) in view of Shikata et al (US 6,255,376).

Bunyan teaches a thermally conductive interface for conductively cooling heat generating electronic components. The composition is interposable between the thermal interface of a heat source and a thermal dissipation member (col 4, lines 39+). The film may take the form of a tape with a release sheet (col 7, lines 33+) and is applied to the interface surface of the dissipation member (col 7, lines 61+). The composition comprises 25-50wt% of a pressure sensitive adhesive, 50-75wt% of an olefinic material having a melting temperature of 50-60°C, and 20-80wt% of a thermally conductive filler (col 8, lines 16+). The adhesive may comprise an acrylic polymer (col 7, lines 30+). The olefinic low melt component may comprise a wax (col 9, lines 9+). The conductive filler may comprise boron nitride (col 9, lines 50+. The composition may further comprise a wetting agent, herein relied upon to read on the claimed surfactant (col 9, lines 59+).

Bunyan does not teach that the composition may comprise a surfactant. However, Shikata teaches a thermally conductive interface material that is used between a heat sink and a heat-generating source (abstract). The composition comprises a thermoplastic carrier and a conductive filler (abstract). The composition further comprises 0.5-5wt% of a glycerin derived surfactant (col 8, lines 30+). Said surfactant ensures a homogenous dispersion of said particles in said carrier (col 8, lines 56+). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the glycerin based surfactant taught in Shikata as the surfactant of the composition taught in Bunyan. The motivation for doing so would have been that Shikata teaches said glycerins are useful for ensuring homogeneous dispersion of conductive particles in thermal interface composition

TO DO STILL

1. Claims 19, 20, 35, and 50-52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Duvall (US 6,391,442), as applied to claims 1-14, 25-27, 30, 31, 36, 40, and 42 above.

Duvall is relied upon as above. Specifically, Duvall teaches a thermal interface material comprising a surfactant. Duvall does not teach the amount of surfactant that should be added. However, it is known in the art that the amount of surfactant added to a composition is controlled in order to obtain the desired surface-active properties of the composition. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to vary the amount of surfactant utilized in the thermal interface material. The motivation for doing so would have been to obtain the desired surface-active properties of the composition.

With regard to the claimed wetting angle of claims 50-52, it is known in the art that the amount of surfactant utilized is proportional to the wetting angle of the composition. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to vary the amount of surfactant added to the thermal interface composition in order to optimize the composition's wetting angle. Furthermore, the examiner takes the position that the claimed "thermal impedance of "less than or equal to 0.8x" is inherent to a composition with the claimed wetting angle since the surfactant insures homogeneous dispersion of the conductive particles.

Duvall does not teach the claimed thermal impedance of claim 50. However, Duvall teaches that the thermal conductance of the composition may be controlled by selecting the particle size, particle distribution, and filler loading concentration of the conductive particle (col 5, lines 40+). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to vary the conductive particle's size, distribution, and concentration in order to obtain the desired thermal impedance.

2. Claims 19, 20, 35, and 50-52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bunyan et al (US 6,054,198), as applied to claims 1, 2, 6, 7, 10-14, 21-23, 25, 27, 28, 30, 31, 36, 40, 41, and 42 above.

Bunyan is relied upon as above. Specifically, Bunyan teaches a thermal interface material comprising a surfactant. Bunyan does not teach the amount of surfactant that should be added. However, it is known in the art that the amount of surfactant added to a composition is controlled in order to obtain the desired surface active properties of the composition. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to vary the amount of surfactant utilized in the thermal interface material. The motivation for doing so would have been to obtain the desired surface-active properties of the composition.

With regard to the claimed wetting angle of claims 50-52, it would have been obvious to one of ordinary skill in the art at the time the invention was made to vary the amount of surfactant added to the thermal interface composition in order to obtain said wetting angle. Furthermore, the examiner takes the position that the claimed "thermal impedance of "less than or equal to 0.8x" is inherent to a composition with the claimed wetting angle since the surfactant insures homogeneous dispersion of the conductive particles.

Bunyan does not teach the claimed thermal impedance of claim 50. However, Bunyan teaches that the thermal conductance of the composition may be controlled by selecting filler loading concentration of the conductive particle (col 9, lines 35+). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to vary the particle size, distribution and concentration in order to obtain the desired thermal impedance.

Response to Arguments

Applicant's arguments filed June 17, 2005 have been fully considered but they are not persuasive.

Applicant argues the references taken together as a whole fail to teach o remotely suggest combination of a non-ionic surfactant with a phase change component in the context of a thermal interface material. The examiner respectfully disagrees. Duvall and Bunyan each individually teaches a thermal interface material. Shikata teaches a thermally conductive interface material comprising a binder, conductive filler and non-ionic material. The examiner, therefore, takes the position that the teachings of Shikata are analogous to the teachings of Duvall and Bunyan because each reference is drawn to a thermal interface material comprising a binder and a conductive filler. Furthermore, the examiner maintains the position that one of ordinary skill in the art would have been motivated to add the surfactant of Shikata to the thermal interface materials taught in DuVall and Bunyan for the reasons noted in the rejections.

Applicant further argues that they have discovered the combination of non-ionic surfactant with a phase change component in the context of thermal interface materials exhibit unexpected results. Specifically, Applicants argue the combination provides improved peel strength and reduced thermal impedance. In particular, Applicants have discovered that the combination leads to a significant increase in peel strength (see examples 1-5). Said arguments are not persuasive because said showing is not commensurate in scope with the pending claims because the species depicted in the examples are not representative of the broader genus claimed and the inventive examples contain components not claimed. Furthermore, the results are not considered to be unexpected. The reduced thermal impedance is suggested by the prior art since the surfactant is taught to ensure homogeneous dispersion of the conductive particle. Furthermore, the specification teaches deltaT and impedance are known to be proportional (see page 11 of specification).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin R. Kruer whose telephone number is 571-272-1510. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carol Chaney can be reached on 571-272-1284. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Kevin R. Kruer
Patent Examiner-Art Unit 1773